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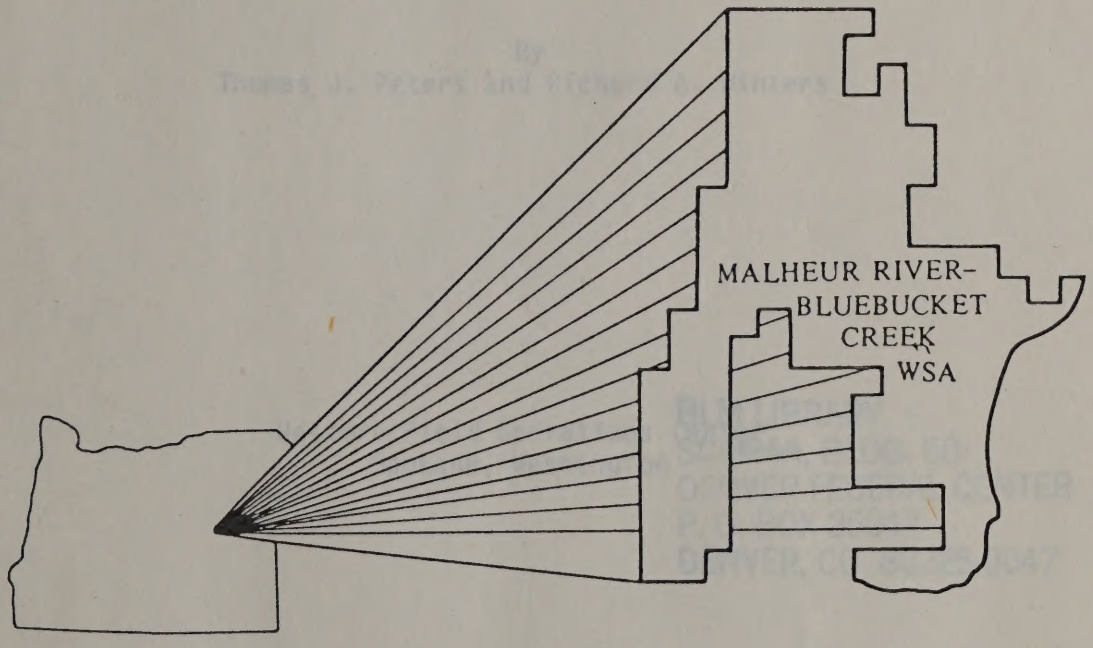

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MINERAL RESOURCES OF THE MALHEUR RIVER-BLUEBUCKET CREEK WILDERNESS STUDY AREA, HARNEY COUNTY, OREGON

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PREFACE

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and U.S. Bureau of Mines to conduct mineral surveys on U.S. Bureau of Land Management administered land designated as Wilderness Study Areas ". . . to determine the mineral values, if any, that may be present . . . ." Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a Bureau of Mines mineral survey of the Malheur River-Bluebucket Creek Wilderness Study Area (OR-002-014), Harney County, OR.

This open-file report will be summarized in a joint report published by the U.S. Geological Survey. The data were gathered and interpreted by Bureau of Mines personnel from Western Field Operations Center, East 360 Third Avenue, Spokane, WA, 99202. The report has been edited by members of the Branch of Resource Evaluation at the field center and reviewed at the Division of Mineral Land Assessment, Washington, DC.

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

ft	feet
in.	inch
m	meter
mi	mile
oz	troy ounce
oz/ton	troy ounce per ton
ppb	part per billion
ppm	part per million
yd^3	cubic yard

SUMMARY

In 1986, at the request of the Bureau of Land Management, the U.S Bureau of Mines studied the 5,560-acre Malheur River-Bluebucket Creek Wilderness Study Area in order to evaluate it's identified (known) mineral resources. The wilderness study area is located in Harney County, OR, about 35 air mi northeast from Burns, and consists of basalt mesas separated by spectacular stream-cut canyons as much as 800 ft deep.

No mineral resources were identified. Basalt was the only material found in abundance. Any forseeable economical use for basalt from the wilderness study area is precluded by distance to potential markets.

The Bureau reviewed pertinent literature and county mining records. During the field investigations, five basalt, one sandstone, and six alluvial samples were taken. No significant metal concentrations were found in the rock samples, and no free gold was detected in the alluvial samples.

INTRODUCTION

This report describes the USBM (U.S. Bureau of Mines) portion of a cooperative study with the USGS (U.S. Geological Survey) to evaluate mineral resources and potential of the Malheur River-Bluebucket Creek WSA (Wilderness Study Area) at the request of the BLM (U.S. Bureau of Land Management). The USBM examines individual mines, prospects, claims, and mineralized zones, and evaluates identified mineral and energy resources. The USGS evaluates potential for undiscovered resources based on areal geological, geochemical, and geophysical surveys.

Results of the investigations will be used to help determine the suitability of the Malheur River-Bluebucket Creek WSA for inclusion into the National Wilderness Preservation System. Although the immediate goal of this and other USBM mineral surveys is to provide data for the President, Congress, government agencies, and the public for land-use decisions, the long-term objective is to ensure the Nation has an adequate and dependable supply of minerals at a reasonable cost.

Setting

The Malheur River-Bluebucket Creek WSA (OR-002-014) consists of 5,560 roadless acres approximately 35 air mi northeast of Burns, OR (fig. 1). The area consists of mesas dissected by canyons as much as 800 ft deep cut by the Malheur River and Bluebucket Creek. The mesas form the southern foothills of the Blue Mountains, which are mainly included in the Malheur National Forest north of the WSA. Elevations range between 3,900 ft, along the Malheur River at the south end of the study area, to 5,200 ft near the northwest corner (fig. 2).

The climate is semi-arid with moderate summers and cold winters. Most precipitation comes during the cooler months as rain and snow. Vegetation consists of grass, sagebrush, and scattered juniper and mountain mahogany; ponderosa pine and some Douglas fir occur in the canyons.

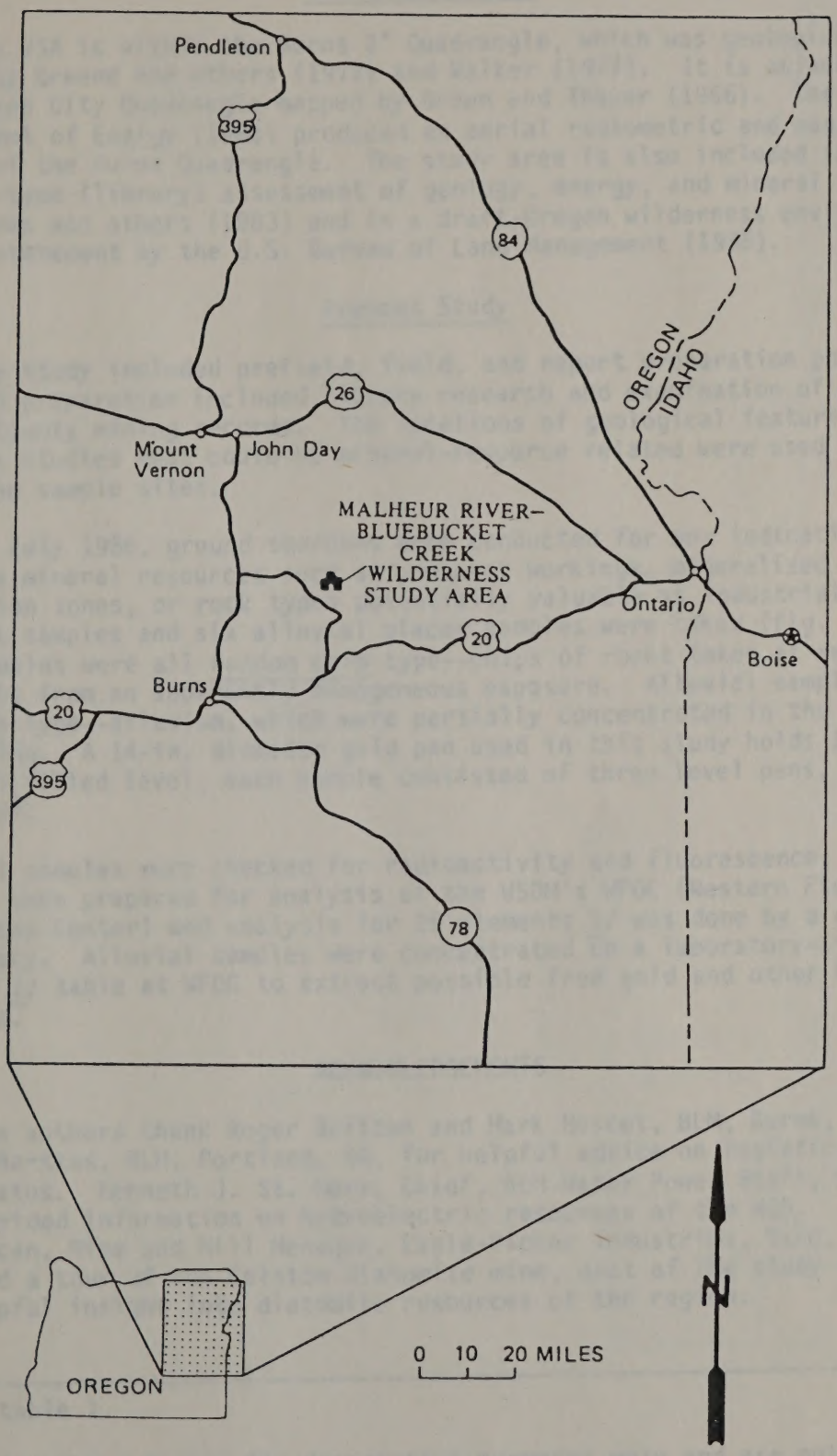


FIGURE 1.– Location of the Malheur River–Bluebucket Creek Wilderness Study Area (OR-002-014), Harney County, OR

Previous Studies

The WSA is within the Burns 2° Quadrangle, which was geologically mapped by Greene and others (1972) and Walker (1977). It is adjacent to the Canyon City Quadrangle mapped by Brown and Thayer (1966). The U.S. Department of Energy (1981) produced an aerial radiometric and magnetic survey of the Burns Quadrangle. The study area is also included in a phase I-type (library) assessment of geology, energy, and mineral resources by Mathews and others (1983) and in a draft-Oregon wilderness environmental impact statement by the U.S. Bureau of Land Management (1985).

Present Study

The study included prefield, field, and report preparation phases. Prefield preparation included library research and examination of BLM and Harney County mining records. The locations of geological features from previous studies that could be mineral-resource related were used to determine sample sites.

In July 1986, ground searches were conducted for any indication of possible mineral resources such as prospect workings, mineralized structures, alteration zones, or rock types potentially valuable as industrial minerals. Six rock samples and six alluvial placer samples were taken (fig. 2). Rock samples were all random chip type--chips of rocks taken at random intervals from an apparently homogeneous exposure. Alluvial samples were all grab type--alluvium, which were partially concentrated in the field by washing. A 14-in. diameter gold pan used in this study holds 1/250 yd^3 when filled level; each sample consisted of three level pans, or 0.012 yd^3.

All samples were checked for radioactivity and fluorescence. Rock samples were prepared for analysis at the USBM's WFOC (Western Field Operations Center) and analysis for 25 elements 1/ was done by a contract laboratory. Alluvial samples were concentrated on a laboratory-size Wilfley 2/ table at WFOC to extract possible free gold and other heavy minerals.

ACKNOWLEDGEMENTS

The authors thank Roger Britton and Mark Hosket, BLM, Burns, OR, and Victor Bartkus, BLM, Portland, OR, for helpful advice on logistics and land status. Kenneth J. St. Mary, Chief, BLM Water Power Staff, Portland, OR, provided information on hydroelectric resources of the WSA. Andrew E. Visocan, Mine and Mill Manager, Eagle-Picher Industries, Vale, OR, provided a tour of the Celatom diatomite mine, east of the study area, and helpful insight into diatomite resources of the region.

1/ See table 1.

2/ Brand names are used for descriptive purposes only and are not intended as an endorsement by the U.S. Bureau of Mines.

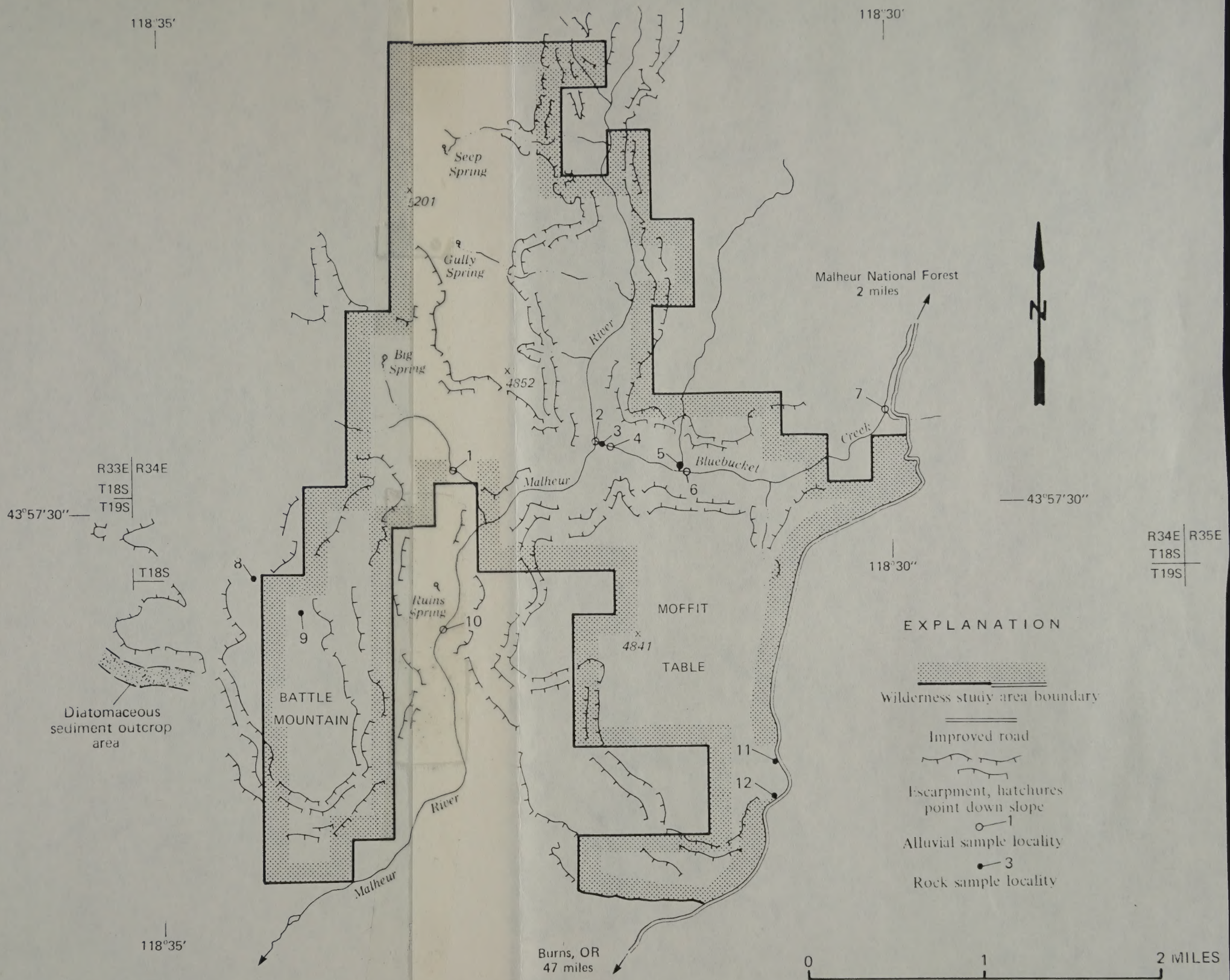
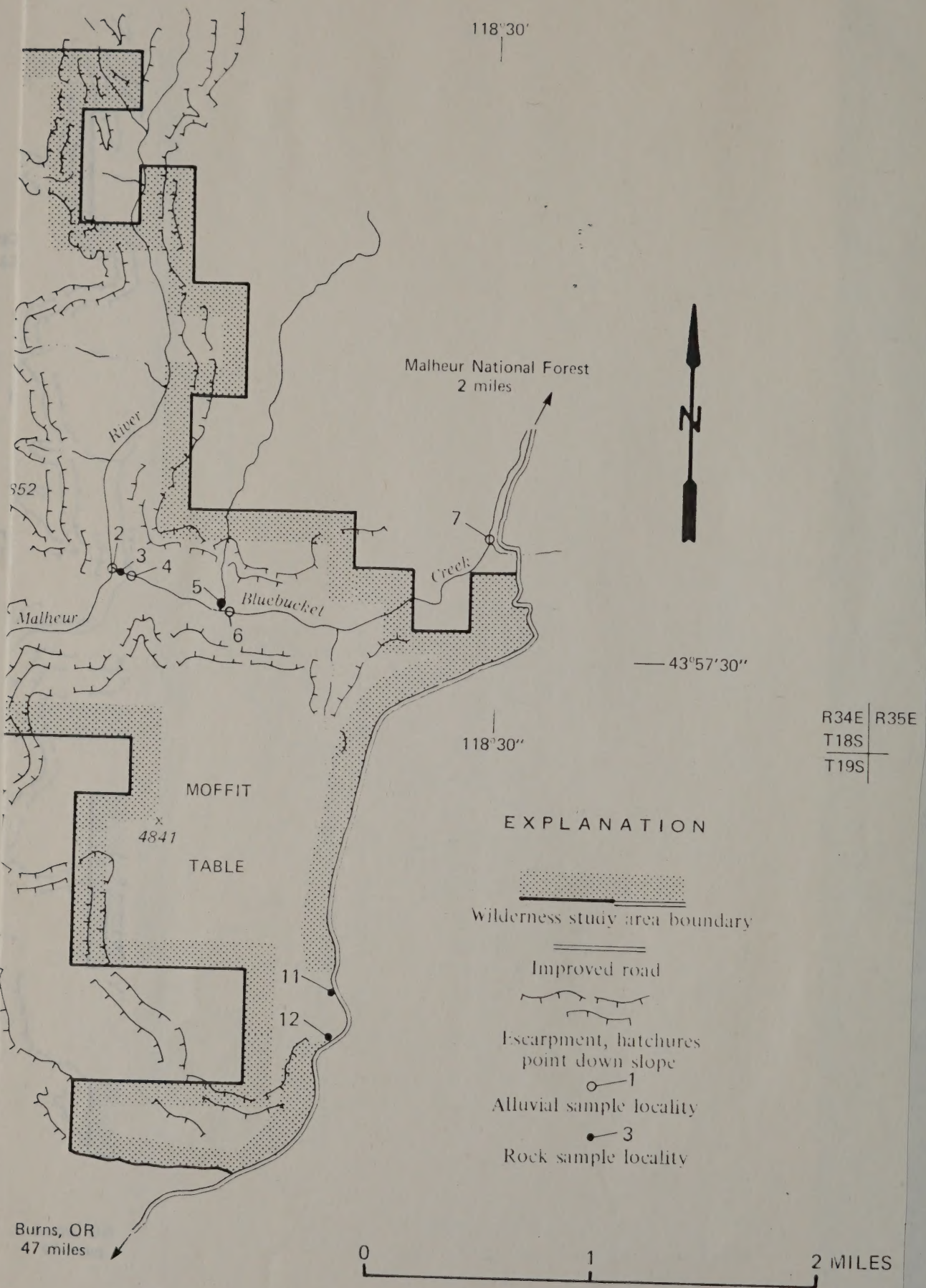


FIGURE 2.– Sample localities in and adjacent to the Malheur River–Bluebucket Creek Wilderness Study Area (OR-002-014) Harney County, OR



alheur River–Bluebucket Creek Wilderness Study Area (OR-002-014) Harney County, OR

MINING ACTIVITY

Bluebucket Creek was probably named after the "Lost Blue Bucket Mine." In 1845, a west-bound wagon train, led by Stephen Meek, stopped "near the headwaters of the Malheur River, on a clear stream running in a southwesterly direction" (Potter, 1982, p. 6). Children playing in the stream collected shiny golden pebbles in an old blue bucket. The bucket was discarded, but a few of the pebbles, really gold nuggets, were carried to the Willamette Valley.

There are no active or patented mining claims, or mineral leases in the Malheur River-Bluebucket Creek WSA. Harney County records indicate the Riley claim was located by George V. Riley in April 1940, one-half mi south of Sage Hen flat, in T. 18 S., R. 34 E., which includes the north half of the WSA (fig. 2). Perusal of the courthouse records, available maps, and a subsequent ground search did not disclose specific locations for Sage Hen Flat or the mining claim. Courthouse records do indicate some mining claim activity in the headwaters portion of the Malheur River drainage basin north of the study area.

Eagle-Picher Industries' Celatom diatom mine, Drewsey, OR, is 15 mi east-southeast of the WSA, and is the only operating mine in the vicinity. The rock formation that hosts the deposit extends into the WSA.

"A portion of the WSA including all of the land along the Malheur River is in a powersite reserve (no. 708) since 1919, which earmarks the land for potential water power and storage development" (U.S. Bureau of Land Management, 1985, p. 2). Classification as a power site reserve does not preclude mining claim location (Victor Bartkus, BLM, 1987, oral commun.).

GEOLOGIC SETTING

Three rock units crop out in the Malheur River-Bluebucket Creek WSA. The lowest unit consists of 40- to 60-m-thick flows of basaltic andesite which are equivalent to the middle Miocene to lower Pliocene Strawberry volcanics of Brown and Thayer (1966). The andesite flows are overlain by Miocene and Pliocene tuffaceous sedimentary rocks of Greene and others (1972), which host the lacustrine Celatom diatomite deposit. In the WSA, the tuffaceous sediments are interbedded with several 3- to 6-m-thick tholeiitic basalt flows within a regional nonmarine intermontane basin (Michael Sawlan, USGS, 1987, oral commun.). The third and uppermost rock unit, mapped as Drinkwater Basalt by Greene and others (1972), is flow basalt, which is nearly horizontal and caps Battle Mountain and Moffit Table.

No diatomite or diatomaceous sediment was observed in the WSA, but an occurrence of diatomaceous sediment up to approximately 365 ft thick occurs directly west of the study area (fig. 2), and may extend under part of WSA in the vicinity of Battle Mountain. The sediment is gritty, generally tan- to cream-colored, and ash- and silt-laden.

Between 10 and 20 percent is relatively pure white diatomite, which occurs as 1- to 2-ft-thick beds. The diatomaceous sediment appears to be covered with a 165-ft-thick basalt cap.

APPRAISAL OF MINERAL RESOURCES

There are no identified mineral resources in the Malheur River-Bluebucket Creek WSA; however, two mineral commodities, diatomite and basalt (stone), occur near and within the study area, respectively. In addition, a dam on the Malheur River Canyon could be constructed for hydroelectric energy and water storage development.

Diatomite is an industrial mineral used primarily as a filter aid (67%) and as a filler (22%) in various manufacturing processess such as papermaking and paint formulation (U.S. Bureau of Mines, 1986, p. 48-49). Other applications include match head composition to control after glow, and concrete additive to improve workability (Kadey, 1983, p. 699).

Diatomaceous sediment west of the study area is too impure to be considered a diatomite resource. Thin beds of white diatomite which make up less than 20 percent of the sedimentary pile could not be separated economically, and cost of underground mining or the removal of the 165-ft-thick basalt cap would be prohibitive. These diatomite beds may extend into the WSA.

The only material abundant in the study area is basalt and basaltic andesite. The basalt is too low in alumina to be a future source of aluminum (Avent, 1970, p. 144), but it could be used for future products like basalt fiber (Wullenwaber and Dailey, 1975). There is no foreseeable domestic need for basalt fiber, and there are abundant basalt resources closer to potential markets. The basalt could currently be used for road metal or stone products, but is not classified as a resource (U.S. Bureau of Mines and U.S. Geological Survey, 1980, p. 1), because convenient sources of road metal are abundant in the region and stone markets are remote.

The waterpower value of Power Site Reserve No. 708, which encompasses the Malheur River canyon in the WSA, was reviewed by the Water Power Staff of the BLM in 1985. The reserve was determined to have no powersite value for the foreseeable future, because storage capacity of a reservoir along the narrow canyon would be limited (Kenneth J. St. Mary, 1987, written commun.).

Five of the six rock samples were of mafic volcanic flows and one sample was of sandstone (nos. 3, 5, 8, 9, 11, and 12, fig. 2). The samples contained no economic concentrations of the 25 elements for which they were analyzed.

Six grab samples of alluvium were collected from principal drainages throughout the wilderness study area (nos, 1, 2, 4, 6, 7, 10, fig. 2). The samples contained no gold and no concentrations of other valuable elements.

TABLE 1.--Analysis of rock samples from the Malheur River-Bluebucket Creek Wilderness Study Area (OR-002-014), Harney County, OR

[Analysis by ICP (inductively coupled plasma) method unless noted: NAA, neutron activation analysis; concentrations in ppm (parts per million) unless noted: ppb, parts per billion; %, percent]

Sample description		Element analysis 1/																				
No.	Description	Al 2/ %	Au NAA ppb	Ba	Be	Bi	Ca %	Co	Cr	Cu	Fe %	K %	Mg %	Mn	Mo	Na %	Ni	P	Pb	Sr	Ti %	V	Zn
3	3/Light gray basaltic andesite weathers reddish-brown; vertical undulatory joints 0.5 to 2 in. apart, may indicate rock crystallized in a pipe-like vent--------	8.45	5	595	<0.5	3	5.03	14	69	43	3.99	1.84	1.92	685	2	2.85	28	1280	6	435	0.613	109	63
5	3/Dark gray basaltic andesite flow weathers reddish tan; joints from 2-ft-wide by 4-ft-wide blocks----------	8.55	<1	655	.5	3	5.55	16	110	53	4.37	1.85	2.40	840	3	2.42	34	1700	4	515	.637	110	69
8	4/Light gray vesicular basalt	7.97	<1	335	<.5	<2	7.47	31	300	68	5.69	.94	5.22	965	2	1.93	114	1070	2	425	.705	144	58
9	4/Gray massive vesicular basalt flow weathers brown----------	8.22	<1	390	<.5	<2	7.80	31	340	72	5.97	.85	4.63	975	2	2.13	117	1070	2	305	.713	158	63
11	4/Light gray vesicular basalt flow----------	7.95	<1	290	<.5	<2	8.14	30	395	75	5.12	.79	5.06	865	2	2.15	145	875	2	270	.603	151	49
12	5/Olive brown conglomeratic volcaniclastic clay-cemented and poorly consolidated sandstone; weathered surface rose pink; forset crossbeds indicate flow was generally south--------	11.10	1	555	1.5	<2	1.66	20	68	52	5.58	.95	.48	555	2	1.28	28	470	12	240	.696	98	71

1/ Cadmium, silver, and tungsten were below detection limits of <0.5, <0.2, and <10 ppm, respectively.
2/ Multiply by 1.89 for equivalent percent Al_2O_3.
3/ Strawberry volcanics of Brown and Thayer (1966).
4/ Drinkwater Basalt of Green and others (1972).
5/ Miocene and Pliocene tuffaceous sedimentary rocks of Green and others (1972).

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